

CONTROL VALVE

2 BACKGROUND OF THE INVENTION

3 1. Field of the Invention

4 The present invention relates to a valve for an inflatable apparatus, and
5 more particularly to a control valve for an inflatable airbed, armchair or the like.

6 2. Description of Related Art

7 A conventional inflatable airbed generally has an inflatable pillow that
8 communicates with the inflatable airbed. The inflatable airbed and the inflatable
9 pillow must be inflated at the same time by a pump. Selectively inflating either
10 the inflatable airbed or the pillow based on a user's needs is impossible.

Therefore, the invention provides a control valve to mitigate or obviate the aforementioned problems.

13 SUMMARY OF THE INVENTION

14 The main objective of the present invention is to provide a control valve
15 which can be operated selectively to inflate two separate spaces in an inflatable
16 apparatus.

17 Other objectives, advantages and novel features of the invention will
18 become more apparent from the following detailed description when taken in
19 conjunction with the accompanying drawings.

20 BRIEF DESCRIPTION OF THE DRAWINGS

21 Fig. 1 is a perspective view of a control valve for an inflatable airbed in
22 accordance with the invention;

23 Fig. 2 is an operational perspective view of an inflatable airbed with the
24 control valve in Fig. 1:

1 Fig. 3 is a cross sectional side plan view of the control valve along line
2 3-3 in Fig. 1 configured to inflate an inflatable pillow;

3 Fig. 4 is a cross sectional side plan view of the control valve in Fig. 1
4 configured to inflate an inflatable airbed;

5 Fig. 5 is a cross sectional top plan view of the control valve along line
6 5-5 in Fig. 4;

7 Fig. 6 is a cross sectional top plan view of the control valve in Fig. 3;

8 Fig. 7 is an operational perspective view of the inflated inflatable airbed
9 and pillow and the control valve in Fig. 1;

10 Fig. 8 is an operational perspective view of another embodiment of the
11 control valve in Fig. 1 in an inflatable armchair;

12 Fig. 9 is a cross sectional top plan view of the control valve in Fig. 8 in
13 an open status;

14 Fig. 10 is a cross sectional top plan view of the control valve in Fig. 8 in
15 a closed status; and

16 Fig. 11 is an operational perspective view of the inflatable armchair with
17 the control valve in Fig. 1 and a deflated air pad.

18 DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

19 With reference to Figs. 1 to 3, a control valve (10) in accordance with the
20 present invention is installed in an inflatable airbed (30) with an inflatable pillow
21 (20). The inflatable airbed (30) and inflatable pillow (20) have separate interiors
22 (not numbered). The control valve (10) is connected to a pump (31) by a supply
23 duct (32), and with the inflatable pillow (20) by a discharge duct (33).

24 The control valve (10) has a horn-like body (11), a seat (12) and a cover

1 (17).
2 The horn-like body (11) has a front (not numbered), a rear (not
3 numbered), a center (not numbered), a central portion (not numbered), a
4 chamber (not numbered), a tubular part (not numbered) and two recesses (111).
5 The chamber is defined in the rear of the body (11) and has an inner wall (not
6 numbered). The tubular part (not numbered) is defined in the central portion of
7 the horn-like body (11) concentrically around the center, has an inner wall (not
8 numbered) and communicates with the chamber. Two recesses (111) are defined
9 respectively at diametrically opposite sides of the inner wall of the tubular part of
10 the horn-like body (11).

11 With further reference to Fig. 5, the seat (12) is mounted on the rear of
12 the body (11), may be circular and has a central portion (not numbered), an outer
13 edge (not numbered), an rear surface (not numbered), a front surface (not
14 numbered), a secondary outlet (13), a primary outlet (14), an inlet (15), a
15 discharge nozzle (16) and two hollow poles (121). The primary outlet (14) is
16 formed through the central portion of the seat (12) and communicates with the
17 chamber. The secondary outlet (13) and inlet (15) are formed through the seat
18 (12) respectively on diametrically opposite sides of the primary outlet (14) and
19 communicate with the chamber. The secondary outlet (13) has a diameter (not
20 numbered) and a secondary valve seat (161). The secondary valve seat (161) has
21 an outer diameter (not numbered), a central through hole (not numbered), an
22 outside surface (not numbered) and an inside surface (not numbered). The outer
23 diameter is larger than the diameter of the secondary outlet (13), and the
24 secondary valve seat (161) is attached concentrically outside the secondary

1 outlet (13). The inlet (15) is connected to the pump (31) by the supply duct (32).
2 The discharge nozzle (16) is mounted on the rear surface of the seat (12) around
3 the secondary outlet (13) and is connected to the pillow (20) by the discharge
4 duct (33). The primary outlet (14) has a diameter (not numbered) and
5 communicates with the interior of the inflatable airbed (30).

6 The two hollow poles (121) are formed on the front surface of the seat
7 (12) and have first resilient members (122) mounted respectively in the hollow
8 poles (121).

9 The cover (17) is movably mounted inside the body (11) and has a rear
10 (not numbered), an inside (not numbered), a center (not numbered), an outer
11 surface (not numbered), a radial flange (not numbered), two rods (not numbered),
12 an O-ring (171), a secondary hollow shaft (172), a primary hollow shaft (173),
13 two notches (18) and two buttons (19).

14 The radial flange is formed at and extends radially out from the rear, has
15 an outer edge (not numbered) and is mounted in the chamber in the horn-like
16 body (11). The two rods are formed on the rear of the cover (17), are mounted
17 respectively in the hollow poles (121) and abut the first resilient members (122).

18 The O-ring (171) is mounted between the outer edge of the radial flange
19 of the cover (17) and the inner wall of the chamber in the horn-like body (11).

20 The secondary hollow shaft (172) is formed longitudinally on the inside
21 of the cover (17), has a distal end (not numbered) and a secondary valve disk
22 (162), is aligned with the secondary outlet (13) and extends into the discharge
23 nozzle (16).

24 The secondary valve disk (162) is mounted on the distal end of the

1 secondary hollow shaft (172) and in the discharge nozzle (16) and has a center
2 (not numbered), an inside surface (not numbered), an outside surface (not
3 numbered) and a disk shaft (163). The disk shaft (163) is formed on the inside
4 surface at the center of the secondary valve disk (162) and is mounted in the
5 distal end of the secondary hollow shaft (172).

6 The secondary valve disk (162) selectively abuts the outside surface of
7 the secondary valve seat (161) to open or close the secondary outlet (13) by
8 moving the secondary hollow shaft (172) longitudinally.

9 The primary hollow shaft (173) is formed longitudinally on the inside of
10 the cover (17) at the center, has a distal end (not numbered), a primary valve disk
11 (175) and a primary valve seat (174) and is aligned with the primary outlet (14).
12 The primary valve disk (175) and the primary valve seat (174) selectively close
13 and open the primary outlet (14).

14 The primary valve disk (175) is mounted on the distal end of the primary
15 hollow shaft (173) and has a center (not numbered), an inside surface (not
16 numbered), an outside surface (not numbered) and a disk shaft (176). The disk
17 shaft (176) is formed on the inside surface at the center of the primary valve disk
18 (162) and is mounted in the distal end of the primary hollow shaft (173).

19 A primary valve seat (174) has an outer diameter (not numbered), a
20 central through hole (not numbered), an outside surface (not numbered) and an
21 inside surface (not numbered). The outer diameter is larger than the diameter of
22 the primary outlet (14). The primary valve seat (174) is attached concentrically
23 to the outside surface of the primary valve disk (175) and selectively closes and
24 opens the primary outlet (14) by moving the primary hollow shaft (173)

1 longitudinally.

2 Two notches (18) are defined on diametrically opposite sides of the
3 outer surface of the cover (17). Two buttons (19) are movably mounted
4 respectively in the notches (18) and respectively have a proximal end (not
5 numbered) and a barb (191). The barbs (191) are formed respectively at the
6 proximal ends and respectively engage the recesses (111) in the horn-like body
7 (11).

8 The two second resilient members (192) are radially mounted
9 respectively in the notches (18) and abut and press the buttons (19) out radially.

10 With reference to Figs. 2, 4 and 5, the cover (19) may be held in an
11 outermost position or an innermost position to selectively open and close the
12 outlets (13, 14). When the barbs (191) are disengaged from the recesses (111),
13 the cover (19) is at the outermost position, which causes the secondary outlet (13)
14 to be closed by the secondary valve seat (161) and the primary outlet (14) to be
15 open. When the pump (31) is actuated, air is pumped through the inlet (15) and
16 the primary outlet (14) into the inflatable airbed (30). Thus, the inflatable airbed
17 (30) is inflated. When a deflating switch (not shown) on the pump (31) is turned
18 on, the inflatable airbed (30) is individually deflated.

19 With reference to Figs. 3, 6 and 7, the cover (19) is pressed inwards to
20 the innermost position and the barbs (191) engage the recesses (111) and hold the
21 cover (19) in position. With the cover (19) in the innermost position, the
22 secondary outlet (13) is open, and the primary outlet (14) is closed by the
23 primary valve seat (174). Therefore, when the pump (31) is actuated, air is
24 pumped through the inlet (15), the secondary outlet (13) and the nozzle (16) into

1 the pillow (20). Thus, the pillow (20) is inflated to raise the inflatable airbed (30)
2 at the pillow end. When the deflating switch on the pump (31) is turned on, the
3 pillow (20) is individually deflated.

4 To individually inflate the inflatable airbed (30) again, the buttons (19)
5 can be pressed inwards and disengaged from the recesses (111) so the cover (17)
6 can be pulled outwards to the outermost position.

7 With reference to Figs. 8 and 9, another application of the present
8 invention uses the control valve (10') with an air armchair (40) having an upper
9 air cushion (41) and a base air cushion (42). The upper air cushion (41) is
10 mounted under the air armchair (40) and communicates with the air armchair
11 (40), and the base air cushion (42) is mounted under the upper air cushion (41)
12 and is separate from the upper air cushion (41).

13 The primary outlet (14) communicates with the upper air cushion (41),
14 and the discharge nozzle (16) is communicates with the base air cushion (42)
15 through the discharge duct (33). The secondary hollow shaft (172') is longer
16 than the secondary hollow shaft (172) in the first embodiment to open and close
17 the discharge nozzle (16) and the primary outlet (14) simultaneously.

18 With further reference to Fig. 10, pressing the cover (17) inwards until
19 the radial flange is at the innermost position causes the secondary valve disk
20 (162) at the distal end of the secondary hollow shaft (172') to close the discharge
21 nozzle (16) and the primary valve seat (174) to close the primary outlet (14).

22 When the cover (17) is pulled outwards and the radial flange is at the
23 outermost position, the discharge nozzle (16) and the primary outlet (14) are
24 open. Therefore, when the pump (31) is actuated, the armchair (40), the upper air

1 cushion (41), and the base air cushion (42) are inflated at the same time.

2 With further reference to Fig. 11, the base air cushion (42) further has a
3 vent (43) defined through the base air cushion (42). When the cover (17) is
4 pressed to close the discharge nozzle (16) and the primary outlet (14), the base
5 air cushion (42) can be deflated individually by opening the vent (43) to lower
6 the height of the armchair (40).

7 For raising the armchair (40) again, the cover (17) is pulled outwards to
8 allow the discharge nozzle (16) and the primary outlet (14) to communicate with
9 the armchair (40), the upper air cushion (41) and the base air cushion (42). Then,
10 the pump (31) is turned on to inflate the base air cushion (42), and the armchair
11 (40) is raised.

12 It is to be understood, however, that even though numerous
13 characteristics and advantages of the present invention have been set forth in the
14 foregoing description, together with details of the structure and function of the
15 invention, the disclosure is illustrative only, and changes may be made in detail,
16 especially in matters of shape, size, and arrangement of parts within the
17 principles of the invention to the full extent indicated by the broad general
18 meaning of the terms in which the appended claims are expressed.